

What is claimed is:

1. A method of processing a signal with frequencies within a frequency band having a bandwidth B, the signal including a plurality of messages, each message having frequencies within a unique frequency band, where the frequency bands of the plurality of messages occupy the bandwidth B, and where messages with adjacent frequency bands may have different bandwidths, said method comprising:

receiving the signal;

separating the signal into groups of messages having frequency bands with the same bandwidth, all messages in any group occupy non-adjacent frequency bands;

combining the messages of each group;

applying each combined group of messages to a separate amplifier to amplify each combined group of messages; and

separating each amplified group of messages into separate messages.

2. A method as claimed in claim 1, further comprising transmitting each separated message to a respective receiving station.

3. A method of communicating a plurality of messages from an originating station, through a relaying station, to a plurality of receiving stations, said method comprising transmitting the plurality of messages from the originating station to the relaying station in a signal with frequencies within a frequency band having a bandwidth B, with each message having frequencies within a unique frequency band, where the frequency bands of the plurality of messages occupy the bandwidth B, and where messages with adjacent frequency bands may have different bandwidths; and at the relaying station:

separating the messages into groups of messages having the same bandwidth, where all messages in any group occupy non-adjacent frequency bands;

combining the messages of each group;

applying each combined group of messages to a separate amplifier to amplify each combined group of messages;

separating each amplified group of messages into separate messages; and transmitting each separated message to a respective receiving station.

4. An article, comprising a storage medium having instructions stored thereon, the instructions when executed processing a signal with frequencies within a frequency band having a bandwidth B, the signal including a plurality of messages, each message having frequencies within a unique frequency band, where the frequency bands of the plurality of messages occupy the bandwidth B, and where messages with adjacent frequency bands may have different bandwidths, the instructions processing the signal by receiving the signal; separating the signal into groups of messages having frequency bands with the same bandwidth, where all messages in any group occupy non-adjacent frequency bands; combining the messages of each group; applying each combined group of messages to a separate amplifier to amplify each combined group of messages; and separating each amplified group of messages into separate messages.

5. An article as claimed in claim 4, wherein the instructions when executed further transmit each separated message to a respective receiving station.

6. An article, comprising a storage medium having instructions stored thereon, the instructions when executed communicating a plurality of messages from an originating station, through a relaying station, to a plurality of receiving stations, the instructions communicating the messages by transmitting the plurality of messages from the originating station to the relaying station in a signal with frequencies within a frequency band having a bandwidth B, with each message having frequencies within a unique frequency band, where the frequency bands of the plurality of messages occupy the bandwidth B, and where messages with adjacent frequency bands may have different bandwidths; and at the relaying station separating the messages into

groups of messages having the same bandwidth, where all messages in any group occupy non-adjacent frequency bands; combining the messages of each group; applying each combined group of messages to a separate amplifier to amplify each combined group of messages; separating each amplified group of messages into separate messages; and transmitting each separated message to a respective receiving station.

7. A apparatus for processing a signal with frequencies within a frequency band having a bandwidth B, the signal including a plurality of messages, each message having frequencies within a unique frequency band, where the frequency bands of the plurality of messages occupy the bandwidth B, and where messages with adjacent frequency bands may have different bandwidths, said apparatus comprising:

- an antenna to receive the signal;
- a first demultiplexor to separate the messages;
- a filter unit to filter and group the separated messages into groups of messages having the same bandwidth, where all messages in a group occupy non-adjacent frequency bands;
- a combining circuit to combine the messages of each group;
- an amplifier for each group of messages to amplify each combined group of messages; and
- a second demultiplexor to separate each amplified group of messages into separate messages.

8. An apparatus as claimed in claim 7, wherein the amplifier comprises a traveling wave tube amplifier.

9. An apparatus as claimed in claim 7, further comprising a transmitting antenna to transmit the separated messages.

10. An apparatus as claimed in claim 7, comprising an earth-orbiting satellite.

11. A communication system, comprising:

an originating station to transmit a signal including a plurality of messages, the signal having frequencies within a frequency band having a bandwidth B, with each message having frequencies within a unique frequency band, where the frequency bands of the plurality of messages occupy the bandwidth B and where messages with adjacent frequency bands may have different bandwidths;

a plurality of receiving stations to receive the plurality of messages; and
a relaying station including an antenna to receive the signal, a first demultiplexor to separate the messages, a filter unit to filter and group the separated messages into groups of messages having the same bandwidth, where all messages in any group occupy non-adjacent frequency bands, a combining circuit to combine the messages of each group, an amplifier for each group of messages to amplify each combined group of messages, a second demultiplexor to separate each amplified group of messages into separate messages, and means for transmitting the separated messages to their respective receiving stations.

12. An apparatus as claimed in claim 11, wherein the amplifier comprises a traveling wave tube amplifier.

13. A communication system as claimed in claim 11, wherein said relaying station comprises an earth-orbiting satellite.